



STO TECHNICAL MEMORANDUM

TM-AVT-ST-004

Integrated Munition Health Management (IMHM): Follow-On Activity to Support IMHM Smart Defence Initiative (SDI)

(Gestion intégrée de l'état des munitions (IMHM): Activité
de suivi en soutien de l'initiative de défense
intelligente (SDI) relative à l'IMHM)

This Report documents the findings of Specialist Team ST-004.



Published June 2018

The NATO Science and Technology Organization

Science & Technology (S&T) in the NATO context is defined as the selective and rigorous generation and application of state-of-the-art, validated knowledge for defence and security purposes. S&T activities embrace scientific research, technology development, transition, application and field-testing, experimentation and a range of related scientific activities that include systems engineering, operational research and analysis, synthesis, integration and validation of knowledge derived through the scientific method.

In NATO, S&T is addressed using different business models, namely a collaborative business model where NATO provides a forum where NATO Nations and partner Nations elect to use their national resources to define, conduct and promote cooperative research and information exchange, and secondly an in-house delivery business model where S&T activities are conducted in a NATO dedicated executive body, having its own personnel, capabilities and infrastructure.

The mission of the NATO Science & Technology Organization (STO) is to help position the Nations' and NATO's S&T investments as a strategic enabler of the knowledge and technology advantage for the defence and security posture of NATO Nations and partner Nations, by conducting and promoting S&T activities that augment and leverage the capabilities and programmes of the Alliance, of the NATO Nations and the partner Nations, in support of NATO's objectives, and contributing to NATO's ability to enable and influence security and defence related capability development and threat mitigation in NATO Nations and partner Nations, in accordance with NATO policies.

The total spectrum of this collaborative effort is addressed by six Technical Panels who manage a wide range of scientific research activities, a Group specialising in modelling and simulation, plus a Committee dedicated to supporting the information management needs of the organization.

- AVT Applied Vehicle Technology Panel
- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS System Analysis and Studies Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

These Panels and Group are the power-house of the collaborative model and are made up of national representatives as well as recognised world-class scientists, engineers and information specialists. In addition to providing critical technical oversight, they also provide a communication link to military users and other NATO bodies.

The scientific and technological work is carried out by Technical Teams, created under one or more of these eight bodies, for specific research activities which have a defined duration. These research activities can take a variety of forms, including Task Groups, Workshops, Symposia, Specialists' Meetings, Lecture Series and Technical Courses.

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INTEGRATED MUNITION HEALTH MANAGEMENT (IMHM): FOLLOW-ON ACTIVITY TO SUPPORT IMHM SMART DEFENCE INITIATIVE (SDI)

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1.0 INTRODUCTION

Integrated Mmunition Health Management (IMHM) is an approach to supply end-to-end supporting information to enhance the management of munitions. Previous AVT activities (AVT-119, AVT-160, AVT-176 and AVT-228) successfully described technologies that would be needed to enable Munition Health Management (MHM) within NATO countries.

The predecessor to this proposed activity, AVT-212 addressed integrated MHM and held a Cooperative Demonstration of Technology (CDT) to show the state of the art. The AVT-212 CDT for “Integrated Munitions Health Management” (IMHM) was held during the 34th Applied Vehicle Technology (AVT) Panel Business Week at NATO HQ in Brussels, Belgium, in October 2014. The three demonstration sessions were introduced by the NATO Chief Scientist – Major General Albert Husniaux, Deputy Assistant Secretary General (DASG) for Defence Investment – Mr. Ernest J. Herold, and the Deputy Director of the Logistics and Resources Division of the International Military Staff – Brigadier General Bo Engelbreth.

The demonstration team represented eight organizations from seven member nations with AVT-212 member expert speakers. NATO Stakeholders and representatives from NATO nations were informed about the benefits of IMHM by the expert speakers. The key IMHM CDT messages were as follows:

- 1) Improper Munitions Management compromises safety and masks catastrophic risk;
- 2) The lack of visibility into munitions’ environmental exposure and accumulated degradation results in premature retirement and incurs cost;
- 3) IMHM is a proven approach to identifying accelerated aging and unsafe munitions;
- 4) Increasing the service accuracy and confidence extends the safe service life of munitions; and
- 5) IMHM is ready and deployable today.

The CDT underscored five compelling IMHM benefits:

- **Safety:** The combination of technology and In-Service Surveillance (process) to inform safety decisions;
- **Cost:** Deferral of asset disposal and replacement (due to longer service life) and reduced expense (effort) for In-Service Surveillance;
- **Reliability:** Greater understanding of current and future asset condition to perform mission objectives;
- **Availability:** Improved knowledge about safe remaining life of munition systems; and
- **Interoperability:** Supports collaboration within and across NATO countries, and enables SMART DEFENCE to create a shared capability stockpile.

Following the CDT, Mr. Herold (DASG) initiated action to propose an IMHM Smart Defence Project as part of the Smart Defence Initiative (SDI) through the Conference of National Armament Directors. The primary objective of AVT-ST-004 was to support this initiative.

2.0 OBJECTIVE(S)

The primary objective was to provide continuing IMHM expert support for the SDI, including cooperation with CNAD Ammunition Safety Group (CASG) Subgroup B in their role as NATO's IMHM SDI project management organization. Activities included:

- Supporting DASG to initiate a Tier 1 IMHM SDI. IMHM by providing expert(s) as/when required;
- Focusing on supporting the IMHM SDI based on specific SDI needs and requirements as they become apparent;
- Supporting meetings at NATO Headquarters;
- Submitting trip reports;
- Providing monthly updates to the AVT Executive Office;
- Providing updates at Panel Business meetings and guidance taken were appropriate; and
- Initiating follow-on AVT activities as/when required.

The activity also supported the 2015 NATO S&T Priority on Advanced Systems Concepts – Logistics Efficiency (ASC-4).

3.0 TECHNICAL TEAM LEADER AND LEAD NATION

Co-Chair: Dr. Steven WAGSTAFF, United Kingdom.

Co-Chair: Dr. Robert A. MUELLER, United States.

Lead Nation: United States.

4.0 NATIONS PARTICIPATION

NATO Nations and Bodies: Canada, Germany, Netherlands, Turkey, United Kingdom, United States.

PfP Nations: None.

MD Nations: None.

ICI Nations: None.

Global Partners: None.

Contact/Other Nations: None.

5.0 STATUS OF ACTIVITIES

The status of the Specialist Team (ST) is complete. Successful items include:

- Initiation of Smart Defence Tier 1 Programme to be led by the United Kingdom and to be delivered into CASG Subgroup B.
- AVT follow-on activity AVT-268 RSM-046 Specialists' Meeting on Advances in Munition Health Management Technologies and Implementation.
- AVT follow-on activity MHM Demo: AVT-292-CDT, "Munition Health Management Technologies: Effects on Operational Capability, Interoperability, Life-Cycle Cost and Acquisition of NATO Nation Missile Stockpiles".

6.0 LIAISON WITH OTHER BODIES

Liaison with other bodies included CASG, AC326, Munitions Safety Information Analysis Centre (MSIAC), Defence Investment (DI) and the Office of the Chief Scientist (OCS).

7.0 LOCATION AND DATES

Activity Start: May 2016.

Activity End: May 2018.

Location: In conjunction with Applied Vehicle Technology (AVT) Panel Business Week (PBW) and as requested by DI, CSO or OCS.

8.0 RECOMMENDATIONS TO THE PANEL/GROUP OR THE SCIENCE AND TECHNOLOGY BOARD (STB)

CDTs are a strong communicator of technologies with associated benefits and formed part of the success of the Specialist Team.

9.0 FUTURE MEETINGS

None.



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